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ABSTRACT

A system for the observation and analysis of elementary school science classroom instruction is described, including the management and content of science lessons for both narrative and coded data. (CS)

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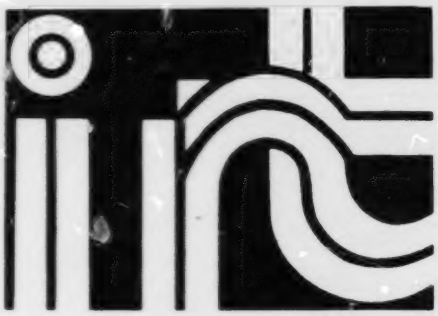

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A SYSTEM FOR OBSERVING AND ANALYZING ELEMENTARY SCHOOL SCIENCE TEACHING: A USER'S MANUAL

Robert Hollon, Charles W. Anderson,
and Edward L. Smith

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Abstract

This user's manual describes a system for the observation and analysis of elementary school science classroom instruction. The system provides a detailed description of the management and content of science lessons, including both narrative and coded data.

The system allows one to analyze classroom instruction by dividing each lesson into a sequence of separate activities or student tasks. Each task is characterized with respect to a number of features, including classroom organization, teacher and student activities, conceptual information content, and science process skills practiced. The system is designed to be used in conjucntion with the Task Features Analysis System (Research Series No. 89), but it can also be used independently.

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A System for Observing and Analyzing Elementary School Science Teaching: A User's Manual

Robert Hollon, Charles W. Anderson, and Edward L. Smith[1]

Introduction

The observation system described in this handbook provides researchers with a detailed description of classroom science instruction. It is designed to provide data in a form that facilitates its comparison with similar data obtained from analysis of program materials used in the classroom (Landes, Smith, & Anderson, 1980). The system has been used to describe classes at the upper elementary level, but could be used at other grade levels too.

Both narrative data and coded data are used in this observation system. The narrative data provide a continuous detailed description of classroom behaviors that occur during instruction. The coded data provide descriptive information suitable for computer analysis. The combination of two types of data allows large amounts of detailed information about the classroom to be rapidly recorded.

The observation system contains three major parts, (1) classroom observation forms that are completed during the lesson and serve as field notes, (2) task description forms that are filled out after the lesson and provide detailed descriptions of each task identified

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during instruction, and (3) a lesson summary, also completed after the lesson, which provides summary information about the lesson as a whole, including additional information not directly observed during the course of instruction.

An Overview of the Coding Process

Four steps are involved in the coding of each lesson.

(1) *Classroom observation forms* are completed as the observer watches the lesson. At 10-minute intervals, the observer records information describing the classroom as a whole, including noise level, teacher and student activities, and teacher location. The observer also takes notes that will serve as the basis for a narrative description of the lesson.

(2) After completing the observation, the observer analyzes the forms to identify all *student tasks* presented during the lesson. After all tasks have been identified, they are numbered in order of occurrence.

Student tasks are the basic unit of instruction in this observation system; the lesson is viewed as a sequence of student tasks. The content and sequence of tasks observed during the lesson can be compared with the sequence of tasks described in the program materials on which the lesson is based.

(3) *A task description form* is completed for each task identified. These forms enable the observer to code detailed information concerning the nature of each task and to record a narrative description of teacher and student behavior while the task is in progress.

(4) The observer completes a *lesson summary sheet*. This form summarizes the coded classroom descriptions from the classroom observation forms and provides space to record notes regarding teacher

knowledge, comments from interviews with teachers, and descriptions of the larger context into which the observed lesson fits. The observer also rates the overall lesson in terms of student learning, management, teacher knowledge, and enjoyment.

The four steps in the coding process have been summarized rather briefly. Each step will be examined in detail in the following sections.

Classroom Observation Forms

Classroom observation forms are used while the observer is in the classroom. The information, which is recorded in rough form, provides the basis for all further analyses; thus the observer must record as much information as possible. A completed sample of the classroom observation form is shown in Figure 1. This example will be used to illustrate the manner in which information is recorded.

The classroom observation form contains four sections. The top section contains spaces for recording the date, student grade level, teacher's name, lesson topic, the number of adults in the room other than the teacher and the observer, and the number of students in the room. Page numbers are entered consecutively for the entire lesson. The code number uniquely identifies each lesson, including information about the teacher, subject, date, and observer.

A separate classroom observation form is completed for each 10-minute interval during the lesson, with two exceptions: The first interval should last only until the clock in the classroom (or the observer's watch) reaches a number which is evenly divisible by 10. The sample classroom observation form in Figure 1 indicates that the time interval began at 2:20.

The last observation interval may also be less than 10 minutes,

Date 12/11 Teacher _____ Code Number _____ Page 2

Grade 4 Topic Sound Other Adults 0 No. of Students 20

CLASSROOM DESCRIPTION

TIME	FORMAT	MATERIALS A	MATERIALS B	Noise (S Q M N)	Teacher Location (F B I R C D O)	Teacher Activity (WCA WCP IN SG PW MON MM NOT O)	Student Activities: On Task (LIS WRT MAT RDG TLK PROC ?)	Student Activities: Off Task (NOT TLK MISB)	Student Task Identification	Teacher Activities	Student Activities
220	1	1	0	2	1	1	16	2 2			
221	1	1	0						#3 Name some sounds	T: "Name some sounds. What do you hear? What do you hear in the hall?	S: responses vary - "cars, chairs, talking, trucks, wind." "other kids talking"
223	1	1	0						#4 Define Sound	T: What is sound? What is necessary to have a sound?	S: "Things move, people, some students are talking among themselves. A few get out their science books. Nobody says vibrations.
										T: "What happens when we don't make sounds?"	"We can't hear it," "nothing moves" - several students are visibly restless.
225	3	1	0						#5 Observe and compare string and rubber band	T: Waves a string in the air, then plucks a rubber band. Student helps make noise with string. "How are these the same? Why doesn't the string make noise unless it's stretched tight?"	S: laugh at string - "They're both moving, the string won't work unless its tight." Students help get string to make a sound - Someone finally says they both vibrate.

FORMATS

1. Lecture/discussion led by teacher
2. Procedural directions from teacher
3. Demonstration by teacher
4. Class led by student
5. AV presentation
6. Small groups, same task
7. Small groups, different task
8. Individuals, same task
9. Individuals, different tasks
10. Transition
11. Dead time
12. Other

Materials used by students

1. None
2. Manipulable science materials
3. Books
4. Workbooks
5. Teacher-prepared worksheets
6. Other worksheets
7. Tests
8. Own paper, notebooks
9. Movies or filmstrips
10. Records or audio tapes
11. Art materials
12. Games or puzzles
13. Materials not included above

Figure 1. Sample completed classroom observation form.

depending on the point at which the teacher indicates that the lesson is finished.

Classroom Descriptions

The second section of the classroom observation form, the classroom description, provides a snapshot of the classroom as it appears at the beginning of each observation interval except the first. The information to be recorded in this section is summarized below:

(1) Time. The time at the beginning of the observation interval is recorded in the left block.

(2) Format. The category best describing the classroom organization or format at the beginning of the observation interval is selected from the list at the bottom of the observation form and its number is entered in the appropriate block. The sample classroom observation form has the number "1" entered, indicating that the students were engaged in a discussion led by the teacher. The formats are summarized below.

1. Teacher academic presentation to the whole class (lectures or class discussions led by the teacher).
2. Procedural directions from the teacher to the whole class.
3. Demonstration by teacher using manipulable science materials.
4. Student presentations to the class or class discussion led by students.
5. Periods when the whole class watches a movie or a filmstrip or listens to a record or a tape recording.
6. Students working in small groups on the same task.
7. Students working in small groups, with different groups having different tasks.
8. Students working individually, with each student working on the same task.

9. Students working individually with different students having different tasks.

10. Transition from one activity to another (i.e., tasks completely lacking in information content and used simply to advance the course of a lesson. A transition implies a period of time when students are doing something solely to prepare for a subsequent task, such as picking up materials).

11. Dead time. No purposeful activity going on.

12. Other activities not covered by the preceding categories.

(3) Materials. The kind of materials being used by the students is recorded in this column. The column is divided into two sections enabling the observer to record instances when students are using two different kinds of materials. Code numbers for materials used by students should be selected from the list at the bottom of the classroom observation form and entered in the appropriate block. If only one type of material is in use, its code number is entered in column A, and a zero is entered in column B.

Note that materials used by teachers are not coded. The sample observation sheet is coded "1" in column A and "0" in column B, indicating that no materials were being used by students at the beginning of the observation interval. Categories describing materials are summarized below.

1. No materials in use.

2. Manipulable science materials.

3. Textbooks or other books.

4. Workbooks.

5. Worksheets prepared by the teacher.

6. Worksheets prepared by someone other than the teacher.

7. Tests.

8. Students' own paper or notebooks.

9. Movies or filmstrips.

10. Records or audio tapes.

11. Art materials.

12. Games or puzzles.

13. Materials not included in the above categories.

(4) Noise level. The observer describes the noise level of the classroom by using one of the following descriptors, (1) silent (S), (2) quiet (Q), (3) moderate (M), and (4) noisy (N).

(5) Teacher location. The location of the teacher in the room is described by the following codes.

Code Number	Descriptor
1	(F) Front of classroom
2	(B) Back of classroom
3	(L) Left side of classroom (viewed from perspective of person at front of room facing class)
4	(R) Right side of classroom
5	(C) Center of classroom
6	(D) Teacher at desk
7	(O) Other (or out of classroom)

(6) Teacher activity. The teacher's activity is described with the following codes.

Code Number	Descriptor
1	(WCA) Whole Class Academic. The teacher is leading a discussion or making a presentation concerning some academic matter to the entire class.
2	(WCP) Whole Class Procedural. The teacher is giving directions to the entire class.
3	(IN) The teacher is talking to an individual.

Code Number cont.	Descriptor cont.
4	(SG) The teacher is talking to a small group of students.
5	(MAT) The teacher is using science materials.
6	(MON) The teacher is monitoring student activities.
7	(PW) The teacher is engaged in paper work.
8	(NOT) The teacher is doing nothing (as far as the observer can tell).
9	(O) Other (or out of room).

(7) Student activities. Ten categories are used to describe student activities. Nine of these categories are grouped into on-task and off-task behaviors. In the space below the appropriate category, the observer records the number of students engaged in a particular behavior at the time of the classroom description.

Code Number	Descriptor
1	(LIS) Listening to the teacher or another student.
2	(WRT) Writing
3	(MAT) Working with science materials
4	(RDG) Reading
5	(TLK) Talking to the teacher, the class, or another student about a lesson-related matter.
6	(PROC) Engaging in a procedural task, such as collecting or putting away materials.
7	(?) Students that could not be seen by the observer (neither on-task nor off-task).
8	(NOT) Students doing nothing.
9	(TLK) Students engaged in social talk unrelated to the lesson.
10	(MISB) Students actively disrupting the class.

The sample classroom observation form began with a classroom description at 2:20 p.m. At that time the students were engaged in a class discussion (Format 1), they were using no materials (materials code 1 and 0), the noise level was quiet (Q), the teacher was at the front of the room (F) engaged in a whole-class academic activity (WCA), and 16 students were listening, two were talking off-task, and two were doing nothing.

Narrative Notes

The remainder of the classroom observation form is used to record narrative descriptions of classroom instruction. Columns for recording time, format, materials, teacher activities, and student activities are found on both the front and back of the sheet. An additional column labeled "Student Task Identification" is present. The use of this column is discussed under "Task Identification," below.

Narrative information is recorded continuously throughout the observation interval. To maximize the amount of detail contained in the descriptions, the following conventions should be observed:

1. Record the time periodically during the observation interval. This enables the observer to examine the amount of time spent on particular activities or tasks.

2. Record the time, format, and materials' codes every time there is a change in format or materials, or whenever an event occurs which interrupts the lesson.

3. Record descriptions of teacher activities and student activities in the two columns at the right. Include specific remarks that indicate a change in the focus of the discussion, descriptions of activities, student questions and answers, comments concerning student attentiveness, behaviors, and so forth. Descriptions need not be grammatically correct, but should be as detailed as possible.

The sample classroom observation form indicates that at 2:21, the students were engaged in a discussion with the teacher. No materials were being used by the students. The narrative description

describes the discussion topic by quoting a teacher question. "Name some sounds. What do you hear?" Several student responses are recorded. The time column indicates that this activity continued until 2:23, when the teacher changed the focus of discussion from naming sounds to defining sounds. The shift in emphasis is illustrated by the narrative descriptions, which contain a new teacher question and several student responses. Note that the description of student activities also contains descriptions of students who aren't actively involved in the discussion as well as the comments of those who are involved.

At 2:25, the format of activity changes from discussion to a teacher demonstration. The new format code is recorded, as well as the codes for student materials. The demonstration is described in detail in the narrative column under "teacher activity." Student reactions, questions, and comments indicate that the demonstration was well understood.

The descriptions in the sample classroom observation form illustrate the general pattern that exists in recording data. Each time the focus of activity or discussion changes, the observer records the time, format, and materials coded for the new activity. Details of the new activity are recorded in the narrative section.

Task Identification

The remaining column on the classroom observation form, Student Task Identification, is used by the observer to identify, name, and number the student tasks. These tasks are the time segments used for detailed analysis of the lesson. Student tasks are identified soon after the observation, while the details of the lesson are still fresh in the observer's memory. For each task identified from the

notes, the observer records a short descriptive statement identifying the task, such as "prepare for science class," or "define sounds." After the observer is satisfied that all tasks have been identified for the entire lesson, the tasks are numbered sequentially.

The sample classroom observation form illustrates three different tasks. At 2:21, the teacher asked the students to "name some sounds." During the course of the task, several other questions were asked, including, "What do you hear?" Because the questions were all related to the students naming sounds, no new tasks were identified.

At 2:23, the teacher asked, "What is sound? What is necessary to have a sound?" These questions changed the focus of discussion from naming sounds to defining sounds. Since the answer to the question, "What are the students being asked to do now?" changed, a new task was identified. At 2:25, the teacher begins a demonstration. The change in format of the lesson indicates that a new task has begun.

Indicators of task changes include (1) changes in information content, or focus of discussion; (2) changes in materials used by teacher or students; (3) changes in the format of the class; and (4) transition periods, such as passing out papers, finding materials, and clean-up activities. Transitions are coded as separate tasks.

Numerous simultaneous tasks can exist, especially in situations where students are working with individualized materials or are working on group projects. Each task is identified and coded separately.

The program materials analysis can also be used to help identify tasks if the observed lesson closely follows the program lesson. The program materials tasks can serve as an organizing framework for separating tasks in the observed lesson, especially in those instances where some question exists about whether an activity represents a part

of some previous task, or is a separate task in itself.

Task Description Forms

After all student tasks have been identified and numbered, the observer completes a series of task description forms. These forms provide a detailed description of each task in the lesson. A sample of a completed task description form is provided in Figure 2.

The task description form has three parts, (1) the top part to record general information identifying the task, observer, and classroom teacher, (2) the second part for numerically coded information describing the task and written supporting information, and (3) the final part, a narrative description of the classroom events which occur during the task. Each part of the task description form is explained in detail in the following paragraphs.

Coded Information and Comments

The second part of the form contains 11 different task descriptors, coded numerically from the information contained in the classroom observation form. For several descriptors, space is available to record additional clarifying information. The descriptors and the coding instructions for each are listed below:

Task. Each task is assigned a code number consisting of the lesson code plus two digits. This number uniquely identifies the task. In the column entitled "Additional Comments," the observer transfers the task description that was recorded in the "Student Task Identification" column of the classroom observation form.

Time. Spaces are provided to record the time of both the task's beginning and its end.

Format. The format code is transferred from the classroom obser-

NUMBER DATE 12/11 OBSERVER Hollon TEACHER 32

TASK DESCRIPTION FORM

DESCRIPTIONS	CODE			ADDITIONAL COMMENTS
TASK	1211323403			Define Sounds
TIME	Start 223		Stop 225	
FORMAT	1			
MATERIALS	1		0	
TEACHER ACTIVITY	1		0	
STUDENT ACTIVITY	1		5	
INFORMATION	Source A	Source B	Code #	
	1	0	248631	Sounds are vibrations
	0	0	0	
SCIENCE TASKS AND PROCEDURES	0		0	
	0		0	
FUNCTION & LINKAGE				Task #5 - Demonstration of vibrating string & rubber band
RELATED PROGRAM TASK	24863			

The teacher asks the class, "What is a sound?" "What is necessary to have a sound?" Several students raise their hands and the teacher calls on them one at a time. Sample answers include "Things move" and "people." No one uses the word "vibrations," which is the definition given in the book.

As the teacher asks the question and the students answer, there is considerable restlessness in the class. Some students are getting out their science books; others talk among themselves.

The teacher then asks, "What happens when we don't make sounds?" Sample answers include "We can't hear it" and "Nothing moves." The restless activity in the classroom continues.

Figure 2. Sample of a completed task description form.

vation form. Additional descriptive information (e.g., the number of students in each group) is recorded as necessary under "Additional Comments."

Materials. Code numbers for materials used by students are transferred directly from the classroom observation form. Additional descriptive information (e.g., the nature of science materials being used) is recorded as necessary under "Additional Comments." Materials being used by the teacher are described under "Additional Comments," but are not coded.

Teacher activity. Teacher activities are coded according to the list presented on page seven. Spaces are provided to record two teacher activities. The primary activity is coded in column A, and the secondary activity is coded in column B. If only one teacher activity is observed, it is recorded in column A and a zero is placed in column B. Since the teacher's activities are described in detail in the narrative, no additional comments are recorded with the code numbers.

Student activities. Student activities are coded in the same manner as teacher activities. The list of student activities is presented on page eight. Because the students' activities are described in detail in the narrative, no additional comments are recorded with the code numbers.

The student activities recorded in this section are those which the teacher directs the students to perform. Off-task activities are not coded unless they occur with the explicit permission of the teacher.

Information. This category is used to compare the information

content of the task with the information contained in program materials. The program materials analysis contains a series of propositions (items of information), each with its own code number. If any of those propositions is addressed during the course of observed instruction, its code number is recorded in the appropriate column. Space for two different propositions is provided.

The medium or source through which each proposition is provided to the students is described in the columns headed "Source." The primary information source is recorded in column A and the secondary source is recorded in column B. If only one source exists, it is coded in column A and a zero is placed in column B. The source codes are listed below.

1. Teacher statement.
2. Science materials used by students.
3. Books.
4. Workbooks.
5. Teacher prepared worksheet.
6. Other worksheet.
7. Chart or poster.
8. Written on chalkboard or overhead projector.
9. Prepared visual materials such as movies, slides, filmstrips, or transparencies.
10. Prepared audio materials such as records or cassettes.
11. Statement by a student.
12. Teacher demonstration.
13. Other.

If propositions in the program materials are significantly modified during the course of classroom instruction, the nature of those modifications is described under "Additional Comments."

The information section is used only to describe propositions addressed both in the program materials and in actual instruction. If the task has little information content (e.g., passing out materials) or if the information content is different from any described in the program materials, then the coded columns are filled with zeroes and

the "Additional Comments" section is left blank.

Propositions that are a part of the observed lesson but are not a part of the program materials are described only in the narrative section of the task description form.

Science Task and Procedures. This section is used when the students perform tasks that help them to gain skill in processes (such as classification or testing hypotheses) that are themselves an important form of science knowledge.

Other tasks merely provide a means for the acquisition of conceptual knowledge (e.g., reading the text), or facilitate completion of the lesson (e.g., arranging desks). Tasks of this nature are not coded in this section, and zeroes are put in all columns.

Science tasks and code numbers are as follows:

10. Design and plan investigations (substantially all in one task).

    11. Formulate problem or question to be investigated.

    12. Formulate hypothesis to be tested.

    13. Design a measurement or observation procedure.

    14. Design an experiement.

    15. Predict a result.

    19. Other.

20. Carry out investigations (substantially all in one task).

    21. Observe.

    22. Measure.

    23. Manipulate apparatus.

    24. Record results, describe observation.

    29. Other.

30. Analyze and interpret results of investigations.

    31. Transform results.

    32. Determine relationship.

    33. Formulate generalization or model.

    34. Explain a relationship.

    39. Other.

40. Analyze an investigation (procedure only).

    41. Analyze the design of an investigation.

    42. Analyze the apparatus and procedures of an investigation.

    43. Analyze the interpretation of the investigation.

    49. Other.

The comments portion of "Science Tasks and Procedures" is used to note when the teacher specified the procedures that students were to follow in completing the task. These procedures can be either explicit (verbal or written directions) or implicit (students pick up materials in a specific order without any direction from the teacher). Whenever a procedure is recorded, under "Science Task and Procedures," the narrative description of the task should include a detailed description of the procedure.

Function and Linkage. The function of a task is a description of how that task fits together with other tasks in the lesson and with other lessons, or a description of the teacher's purpose in having students perform the task. Since tasks may serve a variety of functions, no codes are used in this section. The function is described in the observer's own words in the "Additional Comments" section.

The comments section is also used to record other tasks that are directly related (i.e., linked) to the task being described.

The relationship between two tasks is determined by the function of either or both tasks. The observer should record the number(s) of the related task(s) and a brief description.

Not all tasks will be linked to other tasks. For example, a transition from reading class to science class often involves tasks that are unrelated to any tasks occurring during the science lesson.

Related program task. This space is provided to record the code number of the task described in the program materials analysis that corresponds most closely with the observed task. If the program materials contain no description of an equivalent task, this space is filled with a zero.

Narrative Task Descriptions

The lower portion of the task description form is used to record a detailed narrative of the actual instruction that occurred during the task. The narrative should be in paragraph form, preferably typed or dictated. Because the only sources of information for the narrative are the field notes from the classroom observation form and the observer's memory, the descriptions should be completed as soon as possible after the observation.

The narrative should make it possible for a reader to answer the following questions.

1. What did the teacher and the students do during the task?
2. What did the teacher's instructional decisions, questions, answers to students questions, and the like, reveal about his or her knowledge of the science content?
3. What did the students' behavior, questions, answers, comments, and the like, reveal about their reactions to instruction? Did they understand what they were doing? Were they enjoying it?

4. What procedural or management problems were apparent during the task? How did the teacher deal with them?

Thus the narratives should contain detailed descriptions of classroom procedures, the substance of classroom interactions, and individual student work.

The narratives for individual tasks should be written so that they can be read in sequence as a narrative description of the lesson as a whole.

Lesson Summary Form

The lesson summary form is used to record information concerning the lesson as a whole. The form has three parts, (1) a section to record information identifying the lesson, (2) a summary of the classroom descriptions coded on the classroom observation forms, and (3) a section for written descriptions of the teacher's knowledge of the scientific content of the lesson, teacher interviews or discussions with the observer, and lesson context. Each section is discussed in detail below. A sample lesson summary form is provided in Figure 3.

General Information

The top section of the lesson summary form contains spaces to record general information about the lesson. The lesson descriptors include:

1. Date.
2. Time. Spaces are provided to record both the starting and stopping time for the lesson.
3. Teacher. Space is provided to record the teacher's name and an identifying code number, if one is used.
4. Topic. Record both the lesson topic and code number, if one is used.

LESSON SUMMARY FORM

Date _____ Teacher 32 ( ) Topic sound ( ) Code Number 12113234
Time 2:12 to 2:45 Other Adults Present: Aide 0 Others 0 No. of Students 20
Number of Tasks 12 Observer Hollon
Observer Ratings: Learning 5 Management 5 Teacher Knowledge _ Enjoyment 5

Identifying Data				Noise	Tchr. Loca.	Tchr. Activ.	Student Activities On Task							Off Task		
#	Task	Time	For.	A Mat.	B			LIS	WRT	MAT	RDG	TLK	PROC	?	NOT	TLK	MIS
1.	12113234107	2:30	1	1	0	2	1	1	16							2	2	
2.	12113234105	2:30	1	3	0	3	1	1	13							2	5	
3.	12113234107	2:40	1	3	0	2	1	1	15						1	3	1	
4.																		
5.																		
6.																		
7.																		

Teacher Knowledge

The teacher's knowledge of sound and related topics are quite good. No incorrect information was presented to students, nor were there any situations in which the teacher appeared to lack the necessary background to respond accurately to student questions.

Discussion with Teacher

The overall direction of the unit was described (sound, sound & energy). It was noted that only 1/2 of the students could read the text (Concepts in Science) without difficulty. Other disrupting factors included parent-teacher conferences, student schedule changes, 1/2 day school sessions during conferences.

Lesson Context

The lesson was part of a 2-week unit which eventually would relate sound to energy, a topic which students had discussed earlier. The discussion was partly review of previously covered concepts and partly an introduction to variations in sound.

Figure 3. Sample lesson summary form.

5. Code Number. The observer should record the number which uniquely identifies the lesson.

6. Other Adults. Spaces are provided to record the number of aides and the number of other individuals present during the lesson (excluding the observer).

7. Number of Students. If the number of students present during the lesson changes, the observer should record the number of students present during the majority of the lesson.

8. Number of Tasks. The observer records the number of tasks identified on the classroom observation sheets.

9. Observer ratings of learning, management, teacher knowledge, and enjoyment. The observer rates the lesson on a scale of one to nine for each category. One (1) indicates a low level of success (little learning, poor management, etc.) and nine (9) indicates a high level of success. The criteria for rating each category follow.

   Learning. The rating should reflect both the amount that the students learned and the significance of what they learned. The observer should also consider student responses, student questions, reactions to teacher statements, and the observer's own experience in classrooms in making a decision.

   Management. The rating should reflect the success of the teacher in maintaining classroom order and keeping the students on task.

   Teacher Knowledge. The rating should reflect the observer's perceptions of the knowledge possessed by the teacher. These perceptions can be based on teacher actions during class, including answers to student questions, use of appropriate examples, accuracy of information, obvious misrepresentations of concepts, and so on.

   Enjoyment. This rating should reflect the students' enjoyment of the lesson, as reflected in their behavior, comments, or questions.

Classroom Descriptions

The second section of the lesson summary form is used to summarize all the classroom descriptions recorded on the classroom observation forms. This provides an overall picture of the progress of the lesson. The classroom description data is transferred exactly as it appears

on the classroom observation forms. The code numbers for noise, teacher location, and teacher activities are entered, rather than the alphabetical abbreviations. As an example, the classroom description, found on the sample classroom observation form (Figure 1), has been recorded on the sample lesson summary (Figure 3). The code number of the task in progress at the time of each classroom description is also recorded.

Written Observations

The lower portion of the lesson summary form contains sections for recording observations about teacher knowledge, information obtained through interviews with the teacher, and a description of the overall context of the lesson. The lists below provide a summary of topics to be addressed in each section. The observer should also record other relevant observations that are not on the list.

Teacher Knowledge. Comments should describe specific actions taken (or not taken) by the teacher during class, explanations, responses to student questions, statements to the observer, or responses to observer questions that reveal the extent or limitations of the teacher's subject matter knowledge.

Discussions with the teacher. The observer is encouraged to discuss the lesson informally with the teacher before or after class. If such a discussion takes place, salient points are recorded in this section.

Lesson Context. Comments regarding the context in which lesson took place might include the nature of students (skills, sex, race, etc.), specific "salient" students, teacher characteristics and habits, weather and teacher's health, and the general classroom atmosphere.

Appendix A

Blank Observation Forms

(These forms may be enlarged to an 8½" x 11" format and duplicated for use.)

Classroom Observation Form

Date _____ Teacher _____ Code Number _____ Page_____

Grade ____ Topic _____ Other Adults ____ No. of Students _____

CLASSROOM DESCRIPTION

TIME	FORMAT	MATERIALS A	MATERIALS B	Noise / Teacher Location / Teacher Activity / Student Activities
				Noise: S Q M N (1 2 3 4)
				Teacher Location: F B I R C D O (1 2 3 4 5 6 7)
				Teacher Activity: WCA WCP IN SG PW MON MH NOT O (1 2 3 4 5 6 7 8 9)
				Student Activities — On Task: LIS WRT MAT RDG TLK PROC ? (1 2 3 4 5 6 7); Off Task: NOT TLK MISB (8 9 10)
				Student Task Identification / Teacher Activities / Student Activities

FORMATS

1. Lecture/discussion led by teacher
2. Procedural directions from teacher
3. Demonstration by teacher
4. Class led by student
5. AV presentation
6. Small groups, same task
7. Small groups, different task
8. Individuals, same task
9. Individuals, different tasks
10. Transition
11. Dead time
12. Other

Materials used by students

1. None
2. Manipulable science materials
3. Books
4. Workbooks
5. Teacher-prepared worksheets
6. Other worksheets
7. Tests
8. Own paper, notebooks
9. Movies or filmstrips
10. Records or audio tapes
11. Art materials
12. Games or puzzles
13. Materials not included above

Classroom Observation Form (continued)

TIME	FORMAT	MATERIALS		TASK IDENTIFICATION	TEACHER ACTIVITIES	STUDENT ACTIVITIES
		A	B			

Task Description Form

NUMBER DATE _____ OBSERVER _____ TEACHER _____

TASK DESCRIPTION FORM

DESCRIPTIONS	CODE		ADDITIONAL COMMENTS
TASK			
TIME	Start	Stop	
FORMAT			
MATERIALS			
TEACHER ACTIVITY			
STUDENT ACTIVITY			
INFORMATION	Source A B	Code #	
SCIENCE TASKS AND PROCEDURES			
FUNCTION & LINKAGE			
RELATED PROGRAM TASK			

Lesson Summary Form

Date _____ Teacher _____( ) Topic _____( ) Code Number _____
Time _____to_____ Other Adults Present: Aide ___ Others ___ No. of Students _____
Number of Tasks ____ Observer _____
Observer Ratings: Learning ____ Management _____ Teacher Knowledge _____ Enjoyment ____

Identifying Data					Tchr. Noise	Tchr. Loca.	Tchr. Activ.	Student Activities On Task							Off Task			
#	Task	Time	For.	A M	B				LIS	WRT	MAT	RDG	TLK	PROC	?	NOT	TLK	MIS
1.	_____	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__
2.	_____	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__
3.	_____	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__
4.	_____	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__
5.	_____	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__
6.	_____	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__
7.	_____	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__	__

Teacher Knowledge

Discussion with Teacher

Lesson Context

Science Lesson Rating Form

Teacher number _____ Date _____, 1980

Time of lesson _____to _____ Length of lesson _____minutes.

Briefly describe the lesson.

How many times have you taught this lesson before? _____

Ratings

1. How much do you think the students learned?
(Circle one number)

1	2	3	4	5	6	7	8	9
A very little							A great deal	

2. How much do you think the students enjoyed the lesson?
(Circle one number)

1	2	3	4	5	6	7	8	9
A very little							A great deal	

3. How difficult was it to manage student behavior and materials?
(Circle one number)

1	2	3	4	5	6	7	8	9
Very difficult							Very easy	

4. Overall, how satisfied were you with the lesson?
(Circle one number)

1	2	3	4	5	6	7	8	9
Dissatisfied							Very Satisfied	

Comments on problems, student reactions, etc.

Appendix B

Observation System Codes

Formats

1. Teacher academic presentation to the whole class (lectures or class discussions led by the teacher).
2. Procedural directions from the teacher to the whole class.
3. Demonstration by teacher using manipulable science materials.
4. Student presentations to the class or class discussion led by students.
5. Periods when the whole class watches a movie or filmstrip or listens to a record or a tape recording.
6. Students working in small groups, each group has the same task.
7. Students working in small groups, with different groups having different tasks.
8. Students working individually, with each student working on the same task.
9. Students working individually, with different students having different tasks.
10. Transition from one activity to another.
11. Dead time (time spent with no purposeful activity going on).
12. Other activities not covered by the categories above.

Materials (Used by Students)

1. No materials in use.
2. Manipulable science materials.
3. Textbooks or other books.
4. Workbooks.
5. Worksheets prepared by the teacher.
6. Worksheets prepared by someone other than the teacher.
7. Tests.

8. The students' own paper and notebooks.
9. Movies or filmstrips.
10. Records or audio tapes.
11. Art materials.
12. Games or puzzles.
13. Materials not included in the above categories.

Noise Level

Code Number	Descriptor
1	(S) Silent
2	(Q) Quiet
3	(M) Moderate
4	(N) Noisy

Teacher Location

Code Number	Descriptor
1	(F) Front of Classroom
2	(B) Back of Classroom
3	(L) Left side of classroom (viewed from perspective of person at front of room facing class
4	(R) Right side of Classroom
5	(C) Center of Classroom
6	(D) Teacher at Desk
7	(O) Other (or out of classroom)

Teacher Activity

Code Number	Descriptor
1	(WCA) Whole Class Academic. The teacher is leading a discussion or making a presentation concerning some academic matter to the entire class.
2	(WCP) Whole Class Procedural. The teacher is giving directions to the entire class.
3	(IN) The teacher is talking to an individual.
4	(SG) The teacher is talking to a small group of students.
5	(MAT) The teacher is using science materials.
6	(MON) The teacher is monitoring student activities.
7	(PW) The teacher is engaged in paper work.
8	(NOT) The teacher is doing nothing (as far as the observer can tell).
9	(O) Other (or out of room).

Student Activities

Code Number	(On-task Descriptors)
1	(LIS) Listening to the teacher or another student.
2	(WRT) Writing
3	(MAT) Working with science materials
4	(RDG) Reading

Code Number	(On-task Descriptors cont.)
5	(TLK) Talking to the teacher, the class, or another student about a lesson-related matter.
6	(PROC) Engaging in a procedural task, such as collecting or putting away materials.
	(Neither on-task nor off-task)
7	(?) Students that could not be seen by the observer.
	(Off-task Descriptors)
8	(NOT) Students doing nothing.
9	(TLK) Students engaged in social talk unrelated to the lesson.
10	(MISB) Students actively disrupting the class.

Information Source Codes

1. Teacher statement.
2. Science materials used by students.
3. Books.
4. Workbooks.
5. Teacher prepared worksheet.
6. Other worksheet.
7. Chart or poster.
8. Written on chalkboard or overhead projector.
9. Prepared visual materials such as movies, slides, filmstrips, or transparencies.
10. Prepared audio materials such as records or cassettes.
11. Statement by a student.
12. Teacher demonstration.
13. Other.

Science Tasks and Code Numbers

10. Design, plan investigations (substantially all in one task).
    11. Formulate problem or question to be investigated.
    12. Formulate hypothesis to be tested.
    13. Design a measurement or observation procedure.
    14. Design an experiment.
    15. Predict a result.
    19. Other.
20. Carry out investigations (substantially all in one task).
    21. Observe.
    22. Measure.
    23. Manipulate apparatus.
    24. Record results, describe observations.
    29. Other.
30. Analyze and interpret results of investigations.
    31. Transform results.
    32. Determine relationship.
    33. Formulate generalization or model.
    34. Explain a relationship.
    39. Other.
40. Analyze an investigation (procedure only).
    41. Analyze the design of an investigation.
    42. Analyze the apparatus and procedures of an investigation.
    43. Analyze the interpretation of the investigation.
    49. Other.